

CLAIMS

WE CLAIM:

1. An ultrasonic transmitter comprising:
a piezoelectric polymer film adapted to transmit an ultrasonic acoustic signal
from a front face along a signal path; and
a metallic backer plate adhered to a rear face of the piezoelectric polymer
5 film having a thickness along the signal path substantially thinner than one
wavelength.
2. The ultrasonic transmitter of claim 1 further including a support structure
supporting the metallic backer plate and having an acoustic impedance substantially
different from the metallic backer plate.
3. The ultrasonic transmitter of claim 1 wherein the support structure is a
thermoplastic material.
4. The ultrasonic transmitter of claim 1 wherein the metallic backer plate
includes an outer annular portion surrounding an independently supported inner
center portion.
5. The ultrasonic transmitter of claim 4 further including a first lead attached
to a flexible conductor on the front face of the piezoelectric polymer film to provide
a first electrode and second and third leads attached to the outer annular portion and
the inner center portion, respectively, to provide independent secondary electrodes.
6. The ultrasonic transmitter of claim 5 further including an outer annular
electrode attached on a second face of the piezoelectric polymer film aligned with
the surrounding outer annular portion of the backer plate and an inner center portion
electrode aligned with the inner center portion of the backer plate.
7. The ultrasonic transmitter of claim 1 wherein the piezoelectric polymer
film is disk-shaped.

8. The ultrasonic transmitter of claim 1 further including an oscillator attached to the piezoelectric polymer film operating at a frequency removed from the natural resonance of the ultrasonic transducer.

9. The ultrasonic transmitter of claim 1 wherein the metallic backer plate is stainless steel.

10. The ultrasonic transmitter of claim 1 wherein the backer plate is substantially less than $1/2$ wavelength of the frequency of the acoustic signal.

11. The ultrasonic transmitter of claim 1 wherein the metallic backer plate is less than 0.05 inches thick.

12. The ultrasonic transmitter of claim 1 wherein the backer plate is substantially 0.025-inch thick stainless steel.

13. The ultrasonic transmitter of claim 1 wherein the piezoelectric polymer film is PVDF.

14. The ultrasonic transmitter of claim 1 wherein the metallic backer plate is composed of a plurality of independent electrodes.

15. A quantitative imaging ultrasound device comprising:

an ultrasonic transducer having a piezoelectric polymer film adapted to transmit an ultrasonic acoustic signal from a front face along a signal path and a metallic backer plate adhered to a rear face of the piezoelectric polymer film;

5 an ultrasonic receiver for receiving the ultrasonic acoustic signal along a signal path through a portion of the human body; and

an output device providing an image formed from the received ultrasonic acoustic signal.

16. The imaging ultrasound device of claim 15 further including a support structure supporting the metallic backer plate and having an acoustic impedance substantially different from the metallic backer plate.

17. The imaging ultrasound device of claim 15 wherein the support structure is a thermoplastic material.

18. The imaging ultrasound device of claim 15 wherein the piezoelectric polymer film provides separate electrical connections to an outer annular portion surrounding an independently supported inner center portion.

19. The imaging ultrasound device of claim 18 further including an oscillator attached to the electrodes of the piezoelectric polymer film to provide different signals to the inner center portion and the outer annular portion for quantitative measurements and imaging.

20. The imaging ultrasound device of claim 19 wherein the different frequencies are removed from modes of natural resonance of the ultrasonic transducer.

21. The imaging ultrasound device of claim 20 wherein the backer plate has a thickness substantially equal to an integer multiple of one-half the wavelength of the principle frequency of the oscillator as measured in the metallic backer plate.

22. The imaging ultrasound device of claim 15 wherein the metallic backer plate is composed of a plurality of independent electrodes.